

To Cite:

Chandak R, Chandak M, Bansod R, Thakare P, Sathawane R, Deshmukh P, Akhtar Z, Madne I. Clinicoradiological analysis of a series of cyst at periapex diagnosed in central Indian population. Medical Science, 2022, 26, ms17e1945.

doi: <https://doi.org/10.54905/disssi/v26i119/ms17e1945>

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Peer-Review History

Received: 11 December 2021

Reviewed & Revised: 12/December/2021 to 5/January/2022

Accepted: 5 January 2022

Published: 9 January 2022

Peer-review Method

External peer-review was done through double-blind method.

URL: <https://www.discoveryjournals.org/medicalscience>



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Clinicoradiological analysis of a series of cyst at periapex diagnosed in central Indian population

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ABSTRACT

A frequent jaw bone cyst that can be difficult to diagnose is the odontogenic cyst of the neck and head, because it shares clinical and histopathologic features with other odontogenic lesions. Only around 100 instances of radicular cyst with valid clinical and histopathologic data have been described in the literature to date. In addition, due to lack of a well-documented radicular cyst case series makes it difficult to get a better understanding of the lesion's biological behaviour and appropriate treatment options. As a result, we are reporting three occurrences of radicular cyst of the jaw in our case series.

Keywords: Odontogenic cyst, Periapical pathology, radicular cyst, infected radicular cyst

1. INTRODUCTION

Odontogenic cysts are pathologic cavities lined with epithelial tissue and surrounded by fibrous connective tissue that arise from odontogenic tissues in the tooth-bearing portions of the maxilla and mandible. Bony destruction occurs as a result of cystic diseases in the jaw, which can lead to resorption or displacement of neighbouring teeth. A frequent jawbone cyst is the odontogenic cyst of the neck and head that can be difficult to diagnose because it has clinical and histopathologic characteristics with other odontogenic lesions. In the oral cavity, cystic lesions are common. A pathologic cavity with or without fluid or semifluid material is defined. Radicular cysts are the most frequent inflammatory odontogenic cystic lesions affecting the jaws. They are frequently located in the apices of the teeth that are implicated (Penumatsa et al., 2013). This case series report presents diagnosis of radicular cyst region of maxilla and mandible.

Radicular cysts are most commonly caused by trauma (Lustmann, 1985) or dental caries. Dental caries irritates the pulp cavity, resulting in pulp necrosis. The infection then spreads to the apex of the tooth's root, creating periapical

periodontitis, which can result in granuloma or an acute abscess (Padmawar et al., 2021). A periapical cyst developed as a result of a persistent chronic infection (Mass et al., 1995). Periapical granulomas and radicular cysts are similar on radiographs; whereas radicular cysts are rare and frequently larger (Castro et al., 2017). They usually have no symptoms and are discovered during normal radiologic examinations while, others are symptomatic and require radiologic examinations to be identified. Radicular cysts are treated with nonsurgical root canal therapy when the cyst is small or surgical treatment such as enucleation, marsupialization, or decompression when the cyst is large (Joshi et al., 2011). In this case series, we are reporting three cases of radicular cyst of jaw.

2. CASE SERIES

Case 1

A 62 years old female patient reported to Department of Oral Medicine and radiology with the chief complaint of pain and tingling sensation in lower front and back region of jaw since 6 days. Patient was apparently alright before 15 days. Then she experienced pain in mandibular left back region of jaw for which she went to a dental clinic, where extraction with 36 was done. Periapical radiolucency was seen in the same region; hence biopsy was taken from molar region. After 6 days of biopsy and extraction patient reported to our department with the complaint of pain and tingling sensation in lower front and back region of jaw. Pain was sudden in onset, continuous in nature and of throbbing type. Medical history revealed that the patient was hypertensive and was on medication for the same since 2 years. Dental history revealed extraction before 6 days. Patient had habit of pan, betelnut and tobacco chewing 2 times in a day since 25 years. On extra oral examination face appeared bilaterally symmetrical with a mouth opening of 35mm. No deviation or deflection was evident on mouth opening. Palpatory findings revealed bilaterally synchronous movements with no clicking sound. Muscles of mastication appeared to be normal. A single lymph node in submandibular area was palpable on left side which was tender on palpation. On intraoral examination, the soft tissue structures appeared to be normal. Hard tissue examination revealed healing socket with 36 along with tenderness on vertical percussion in same region. Mesial caries with 18, 28, grossly decayed 16, root piece with 46, grade II mobility with 26 was seen. Hence, a provisional diagnosis of postextraction neuritis on left side of mandible was made (Figure 1).



Figure 1 Clinical Pictures

Patient was then subjected to radiological examination an OPG was taken. OPG reveals a Single Localized unilocular radiolucency seen in mandibular region apical to the roots of 36 of size approx. 6.5 X 10.4 mm extending from mesial root of 36 to distal root of 36. Periphery is well defined. Margins are regular and well corticated. Shape is roughly oval. Internal structure is completely radiolucent and radiolucency seen impinging inferior alveolar nerve (Fig 2). Biopsy was done and the specimen was sent for histopathological examination before that written & oral informed consent was obtained from the patient.

Histopathological examination revealed cystic lumen lined by varying thickness non-keratinised stratified squamous epithelium showing arcading pattern at various places. Surrounding fibrous capsule consist of collagen fibre bundles, few endothelial lined capillaries and moderate chronic inflammatory cell infiltrate and numerous capillaries along with thin bony trabeculae suggesting features of a radicular cyst. Extraction was done with 36 after extraction patient was then subjected to radiological examination an OPG and CBCT were taken. OPG reveals a Single Localized unilocular radiolucency seen in mandibular region apical to the roots of

36 of size approx. 6.5 X 10.4 mm extending from mesial root of 36 to distal root of 36 with loss of cortication. Shape is roughly oval. Internal structure is completely radiolucent and radiolucency seen impinging inferior alveolar nerve.



Figure 2 Orthopantomogram showing aradiolucent cystic cavity apical to the roots of 36 having corticated borders, loss of lamina dura can be seen with 36.



Figure 3 OPG showing extraction with 36 along with cystic cavity.



Figure 4 showing perforated buccal cortical plate and a radiolucent lesion of size approx. 7 X 10 mm having oval shape on left side of mandible.

CBCT was done to examine the extent of the lesion three dimensionally (Fig 4). Based on radiological findings, radiographic diagnosis of infected radicular cyst in relation with 36 was made and a treatment plan was formulated to manage the case through surgical approach (curettage).

Case 2

A 52-year-old male patient reported to the Oral Medicine and Radiology department with the chief complaint of mild pain in relation to the right upper front tooth region of jaw since 2-3 months. Patient gives history of trauma 15 years back. On clinical examination, there was a palatal swelling, extending from teeth 11 to 14, but not crossing the midline of the palate (Fig 5). The dental history revealed that antibiotics and analgesics had been prescribed at private dental clinics for the same chronic swelling for the past 2-3 months. The patient's medical history was unremarkable. A yellowish-brown discolouration was seen in relation to 12, which was non-vital in support of 13. On palpation, the lesion was soft and fluctuant. The buccal vestibule was devoid of any swelling or draining sinus tract. Lymph nodes were non-palpable. Oral hygiene was poor with grade II stains and calculus. Based on clinical examination, provisional diagnosis of radicular cyst with 11, 12, 13 and 14 was made.

The patient was advised for an intraoral periapical radiograph (IOPA). (Fig 6) and cone beam CT (CBCT) (Fig 7) of the same region. Radiographic examination revealed a large unilocular radiolucency with well-defined radiopaque border (Fig 6). Routine laboratory investigations were within normal limits. Aspiration with a fine needle revealed turbid brown-coloured fluid, consisting dense infiltrate of acute inflammatory cells, predominantly polymorpho nuclear leukocytes (Fig 8) before FNAC, written & oral informed consent was obtained from the patient.



Figure 5 clinical photographs showing a large palatal swelling extending from 11 to 15 not crossing the midline



Figure 6 IOPA showing a well-defined radiolucent lesion with respect to 11 and 12 with well -defined corticated borders and loss of lamina dura with 11 and 12.



Figure 7 Axial section showing unilocular well defined radiolucency apical to 11,12,13 and 14 of size approx. 16 X18mm. seen in different sections of CBCT.



Figure 8 FNAC yielding turbid brown-coloured fluid.

Based on History, Clinical examination, Radiological findings and FNAC report diagnosis was made of Radicular cyst with respect to 11,12,13 and 14 and the and a treatment plan was formulated to manage the case through conservative & surgical approach. Root canal therapy was performed with 12, 13 followed by surgical enucleation of lesion.

Case 3

A 22-year-old female patient presented to the Oral Medicine & Radiology Department with the primary complaint of pain in the upper left anterior front tooth region of the jaw that had been present for 1–2 months. Patient gave history of trauma due to collision with hand pump where she got injured and suffered from trauma in the area of chief complaint. Patient's general condition was normal. On extraoral examination, no inspectory findings were evident. On intraoral examination, the inspectory findings revealed Ellis class II fracture with 21 (Figure 10) along with tenderness on vertical percussion. No obliteration of the buccal vestibule was noted in the same region. So, we went for a pulp vitality test to rule out the tooth's viability, in which 21 was found to be non-vital (Figure 9).



Figure 9 showing pulp vitality test with 21.

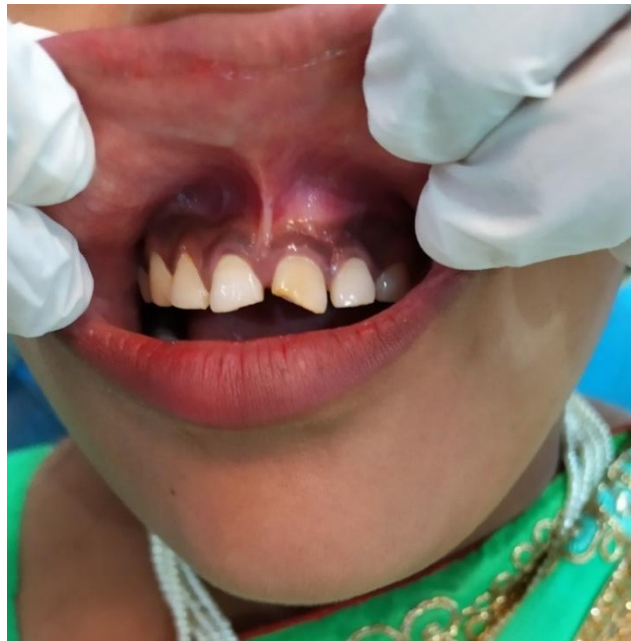


Figure 10 showing Ellis Class II fracture with 21



Figure 11 CBCT image showing bone resorption in the apical region of 21 and 11

A 3D Cone beam computed tomographic scan (Figure 11) revealed a well-defined radiolucency surrounded by a sclerotic border in the apical region of 21 of size approximately 2×2 cms with loss of cortication of the buccal plate, suggesting a cystic lesion (Figure 12).



Figure 12 CBCT section showing well defined radiolucency in the periapical region of 21 surrounded by sclerotic border of size approx 20×20mm in size with loss of buccal cortical plate.

A clinical diagnosis of infected radicular cyst in connection to upper anterior left central incisor (21) was determined based on the history, clinical examination, and radiographic examination and a treatment strategy was developed to address the case using both a conservative and surgical approach. Before treatment, written & oral informed consent was obtained from the patient. Root

canal therapy was performed with 21. Further the treatment was carried out by surgical enucleation of the cystic lesion with respect to 21 and the patient will be followed up simultaneously.

4. DISCUSSION

The odontogenic cyst of the neck and head, discovered by Penumatsa et al., (2013), is a frequent jawbone cyst with a difficult diagnosis due to clinical and histopathologic similarities with other odontogenic diseases. In the oral cavity, cystic lesions are common. The most common inflammatory odontogenic cystic lesions affecting the jaws are radicular cysts. They are generally present at the apices of the teeth that are involved. Radicular cysts are most commonly caused by trauma or dental caries based on analysis of 23 cases (Lustmann, 1985).

According to Dental caries and trauma produce inflammation of the pulp cavity which leads to pulp necrosis. The infection subsequently travels to the apex pertaining to the tooth's root, creating periapical periodontitis, which can result in chronic granuloma or an acute abscess. A periapical cyst formed as a result of a long-term chronic infection (Mass et al., 1995). The aetiology of radicular cysts was characterised by Shear et al., (1992) as consisting of three separate phases: initiation, development, and growth. Radicular cysts are inflammatory jaw cysts. They begin as epithelial remnants in the periodontal ligament following the necrosis and death of the tooth pulp as a result of apical periodontitis. Radicular cysts are discovered through routine radiography examinations or after an abrupt worsening of the condition (Joshi et al., 2011). It also stated that whereas radicular cysts are usually asymptomatic and may be diagnosed by radiography, long-term cases may experience an acute aggravation of the cystic lesion, resulting in signs and symptoms in the patient such as swelling, tooth mobility, and tooth displacement (Joshi et al., 2011).

Nonkeratinized stratified squamous epithelium lines radicular cysts according to Cawson et al., (2002) and Natkin et al., (1984). The lining might be continuous or discontinuous, with a thickness varying from 1 to 50 cell layers. The epithelial lining may be proliferative in the early stages, arcing with a strong persistent inflammatory infiltration. The cyst lining becomes quiescent with a degree of differentiation as it becomes larger, resembling simple stratified squamous epithelium. PMSs make up the majority of the inflammatory cell infiltration in the growing epithelium. Uloopi et al., (2015) discovered stratified squamous epithelial lining histopathologically, which might indicate exocytosis, hyperplasia, or spongiosis. The lumen is usually filled with fluid and cellular debris. The wall is made up of thick fibrous connective tissue with an inflammatory infiltrate that comprises lymphocytes mixed with neutrophils, plasma cells, histiocytes, mast cells, and, on rare instances, eosinophils.

Radiographically, most radicular cysts in the periapical region presents as unilocular, round or pear-shaped, and radiolucent according to Scholl et al., (1999). They are generally smaller than 1 cm in diameter and have a thin cortical bone ring around them. The linked tooth frequently has a big carious lesion or a deep repair. The cyst may cause minor root resorption or displace neighbouring teeth. Radicular cysts and periapical granulomas have a radiographic look that is similar, but radicular cysts are less common and often bigger. According to Namdar et al., (2012), this cyst presents as a well-defined unilocular radiolucency placed periapical to a tooth with pulp involvement and dental caries, with a size of over 2 cm and a radio-opaque sclerotic border that may be lost in situations of subsequent infection. Similar finding was found in our case.

The cyst was asymptomatic in the current case, but there was considerable extraoral swelling, which is consistent with Shear et al., (2007) results that the most prevalent cause of jaw bone growth is a radicular cyst. They are painless until they become infected later. The cyst extends bone hard at first, then springs back and crackles like an egg shell as it swells in size. When the outer cortex is removed, the swelling becomes rubbery and fluctuant. The magnitude of the lesion, its proximity to noble structures, clinical characteristics of the lesion, as well as the patient's systemic status, according to Shear et al., (1992) influence treatment possibilities. Nonsurgical RCT may be employed when the lesion is limited to a small area, but surgical treatment such as enucleation, marsupialization, or decompression may be utilised if the lesion is larger.

5. CONCLUSION

A radicular cyst is an inflammatory cyst that develops from malassez epithelial resting in the periodontal ligament as a result of tooth pulp inflammation. The cyst starts with a carious tooth and then spreads to the periapical and periodontal areas. The large numbers of these lesions involves the whole apex and are radiolucent. Because the cystic lesion is bordered by epithelium and filled with fluid, it is referred to as a genuine cyst. This clinical series of radicular cysts were effectively treated with endodontic treatment and surgical enucleation and debridement of the cystic lesions. This clinical series of radicular cyst shows how to successfully diagnose and treat radicular cysts using surgical and non-surgical treatments, depending on the cyst's size and location. Although large lesions are treated endodontically before being surgically enucleated, some writers suggest for nonsurgical treatment of minor lesions.

Acknowledgement

We are gratefully acknowledged the support provided from Dr. Rakhi Chandak and Dr. Ramhari Sathawane for his guidance and supervision and we are also thankful for paramedical staff for providing us histopathology details immediately regarding our cases.

Author Contributions

Dr. Rakhi Chandak: Supervision, Writing, review, and editing of the manuscript

Dr. Manoj Chandak: Proposal writing, Data collection and data entry

Dr. Pranali Thakare: Writing, review, editing of the manuscript

Dr. Runal Bansod: Proposal writing, Data collection, Writing, review

Dr. Ramhari Sathawane: Writing of the manuscript

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Dr. Zareesh Akhtar: Data collection and data entry

Dr. Isha Madne: Editing of manuscript

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study.

Funding

The study did not receive any external funding

Conflict of interests

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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